Module 7
Inspections

Learning Objectives

By the end of this section, you will:

1. Understand the importance of inspections.
2. Identify the different types of inspections and the requirements for each.
3. Know who is allowed to perform inspections.
4. Cite the organizations and standards that mandate inspections.
5. Identify the conditions that require an inspection in addition to the standard inspections.
6. Summarize how to perform an inspection.
7. Know operators response if an unsafe condition is found.

Fall Protection

While at a work station on any part of the equipment (including the boom, of any type), except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

OSHA 1926.1423 (e)(2) & (f)

For assembly/disassembly work, the employer must provide and ensure the use of fall protection equipment for employees who are on a walking/working surface with an unprotected side or edge more than 15 feet above a lower level, except when the employee is at or near draw-works (when the equipment is running), in the cab, or on the deck.

Shift Inspections

OSHA 1926.1412(d)

Why are shift inspections important?

» Shift inspections provide the best opportunity to find problems resulting from operations before they can cause any damage or harm anyone.

What aspects of the crane need to be inspected? Be specific.

» Control and drive mechanisms.
» Air, electrical and hydraulic systems.
» Hooks and latches.
» Tires.
» Ground conditions.
» Safety devices + Operational aids.

The shift inspection is the first step to ensuring a safe and productive shift.

The shift inspection is a visual inspection of the crane and must be completed by end of shift.

This inspection should be taken as seriously as any other routine or scheduled inspection. This is the most fundamental inspection of all since it involves the primary structure of the crane and it's components.

The primary purpose of a shift inspection is to look for immediate and potential hazards.

A thorough inspection is the method of identifying necessary maintenance and detecting potential hazards which could contribute to accidents or equipment failure. The lack of an adequate inspection could mean serious deterioration to the equipment and expensive replacement or repair. Pre-operational inspections are intended to prevent minor problems from becoming progressively more dangerous.

Most accidents caused by equipment failure can be easily avoided by a thorough shift inspection.

Inspections are essential for determining conditions that could lead to unsafe operation or damage to crane equipment. An operator can never over inspect a crane when it comes to safety of the operator or other personnel working around the crane. The pre-operational, or any, inspection should not be considered a cursory look at the equipment. No matter how often the equipment is used or how familiar the operator is with the crane, the same intensive inspection should be conducted each time the crane is used.

No lift, however small or light, is insignificant.

A crane should not be operated with a deficiency that the operator feels is unsafe. The capacity of a crane is established for a crane that is in good condition.

Each crane has a log book with the crane's serial number.

It should be kept throughout the crane's life for recording the details of all inspections, modifications, repairs, maintenance and incidents of misadventure.

1. Who should conduct a shift inspection?

» A competent person must begin a visual inspection prior to each shift and complete it before or during that shift. The operator should have enough practical and theoretical knowledge of the equipment to not only detect defects and potential hazards, but assess their importance in relation to the strength and functions of the equipment.

Subpart CC

2. At a minimum, what must the shift inspection include?

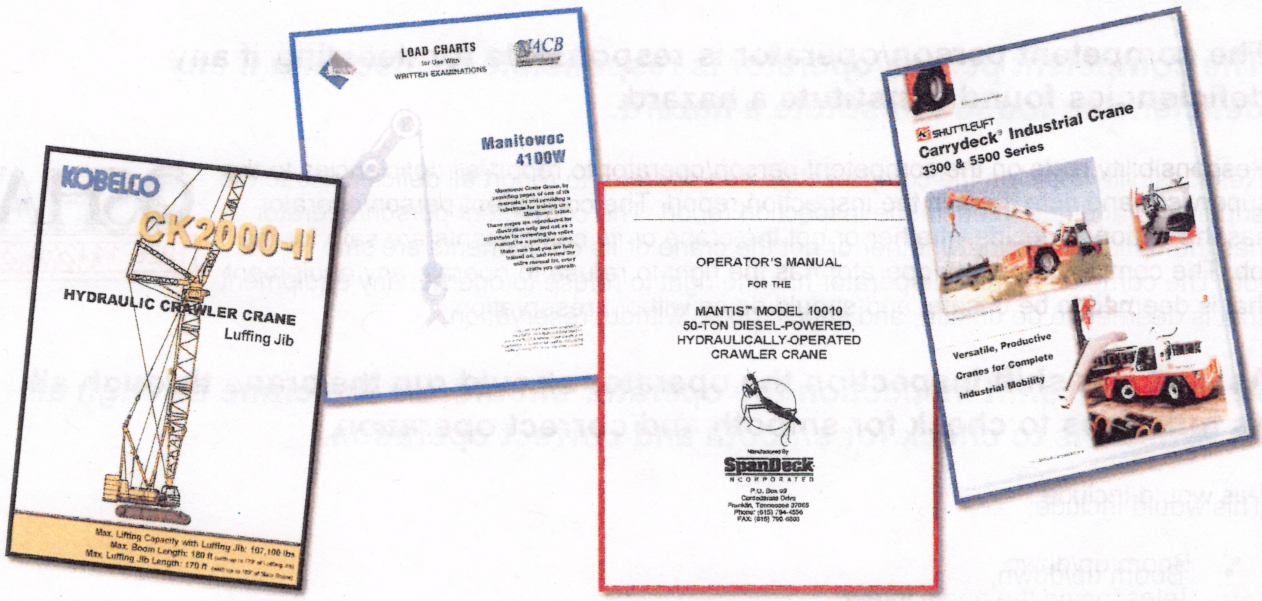
- Control mechanisms for maladjustments.
- Control and drive mechanisms for excessive wear and contamination by lubricants.
- Air and hydraulic systems for deterioration or leaks.
- Hydraulic systems for proper fluid levels.
- Hooks and latches.
- Wire rope.
- Electrical apparatus.
- Tires for proper inflation.
- Ground conditions.
- Equipment level within manufacturers specs.
- Windows for anything that hampers view.
- Rails, stops, clamps, and supporting surface.
- Safety devices.
- Operational aids.

Before any crane is operated, it must be inspected by a competent person.

Often this person is the operator who will assess the equipment for potential hazards and defects. Competent means knowledgeable, experienced and able to resolve problems. Safety and reliability can only be assured when the crane and it's related components receive regular and routine inspections.

Cranes can differ - consult owners' manuals and charts.

Never assume the inspection method for one crane is the same as for another. Certain information is specific to each piece of equipment even when the equipment is made by the same company. Variations in model numbers can produce great differences. Cranes can vary in certain areas, such as lift capacity, fluid levels and tire pressure.



Where the employer has taken the equipment out of service, a tag must be placed in the cab.

OSHA 1926.1417(f)

This standard covers the servicing and maintenance of machines and equipment in which the unexpected startup or release of stored energy could cause injury to employees. If a device can not be locked out, it shall use a tag out system. All employees who may work on or in an area where energy control procedures are in place shall be instructed in the procedures and prohibitions in attempts to restart or energize the equipment.

(1) Where the employer has taken the equipment out of service, a tag must be placed in the cab stating that the equipment is out of service and is not to be used. Where the employer has taken a function out of service, a tag must be placed in a conspicuous position stating that the function is out of service and is not to be used.

(2) Response to "Do not operate" tag out signs.

(i) If there is a warning (tag out or maintenance/do not operate) sign on the equipment or starting control, the operator must not activate the switch or start the equipment until the sign has been removed by the person authorized to remove it, or until the operator has verified that:

(a) No one is servicing, working on, or otherwise in a dangerous position on the machine.

(b) The equipment has been repaired and is working properly.

(ii) If there is a warning (tag out or maintenance/do not operate) sign on any other switch or control, the operator must not activate that switch or control until the sign has been removed by a person authorized to remove it, or until the operator has verified that the requirements in paragraphs (f)(2)(i)(a) and (b) of this section have been met.

The competent person/operator is responsible for deciding if any deficiencies found constitute a hazard.

OSHA 1926.1412(d)(2)

Responsibility rests on the competent person/operator to report all deficiencies to the supervisor and note them in the inspection report. The competent person/operator has the option to decide whether or not the crane or its components are safe for the job. The competent person/operator has the right to refuse to operate any equipment that is deemed to be unsafe, and should do so without reservation.

As part of a shift inspection the operator should run the crane through all its functions to check for smooth and correct operation.

This would include:

- Boom up/down,
- Telescoping the boom in/out,
- Hoisting up/down,
- Swinging the boom left/right,
- Extending/retracting outrigger beams and stabilizers.

Monthly & Additional Inspections

Each month the equipment is in continuous service it must be inspected by a competent person.

OSHA 1926.1412(e)

This is the same as the shift inspection except documentation is required.

The information for monthly inspections must be documented.

The items checked and the results, as well as the name and signature of the person who completed the inspection must be documented and kept for at least three months. All documents produced must be available, during the retention period, to all persons who conduct inspections.

What conditions necessitate an additional inspection?

OSHA 1926.1412

- All new or rented equipment.
- Modified equipment.
- Repaired/adjusted equipment.
- Post assembly.
- Severe service.
- Equipment not in regular use - idle for 3 months or more.
- Manufacturer's more comprehensive schedule.
- Equipment involved in an accident.

All inspections should be performed with a detailed instruction sheet.

Why?

- Inspections should start by ensuring the proper manual and log book are available and should be done in a systematic fashion.

What are some common safety features that need to be checked during an inspection?

- Rear view mirrors.
- Clearly audible outside signal.
- Readily accessible fire extinguisher.
- Self-filler caps and flame arrestors on fuel tanks.
- Wheel chocks.
- Suitable lighting for night operations.
- Boom drum stop devices.
- Boom stops.
- Hoist shutoffs.

Crane Operator Daily Inspection Report

(Satisfactory, Unsatisfactory, Not Available)

Carrier Inspection	S	U	NA	Crane Inspection	S	U	NA
1. Oil, fuel, hydraulics levels & Antifreeze				1. Annual inspection & proper load chart			
2. Safety guards & plates				2. Gauges			
3. Carrier frame / Tracks / Carbody				3. Operating manual			
4. Wire rope				4. LMI, Computer			
5. Reeving				5. Warning lights			
6. Hook block, ball, sheaves & safety latches				6. Controls, brakes & clutches			
7. Boom / extension & jib				7. Safety devices			
8. Walkways, ladder & handrails				8. Emergency stop			
9. Swing lock, chocks & stops				9. Boom angle, radius indicator			
10. Wheels & tires				10. Fire extinguisher			
11. Leaks: Fuel, Hydraulic & Antifreeze				11. Warning labels			
12. Outriggers, pads, pins & locking device				12. Load test: brakes, etc.			
13. Exhaust leaks or cracks				13. Ground condition			
14. Glass				14. Proper cribbing & blocking			
15. Lights				15. Power line hazard			
16. Battery				16. Swing & counterweight clearance			
17. Spare tire				17. Overhead obstructions			
18. Emergency equipment in cab				<u>Rigging</u> 1. Wire rope slings			
19. Two way radio				2. Nylon slings			
20. Cab clean				3. Shackles			
21. Lubrication				4. Other rigging			

If marked "unsatisfactory" describe the reason: _____

_____

_____

Crane: _____ Serial #: _____

Hours of Carrier: _____ Date: _____

Hours of Crane: _____ Operator Signature: _____

Annual/Comprehensive Inspections

At least every 12 months, the equipment must be inspected by a qualified person.

This is more detailed than the shift and monthly inspections, where disassembly is required, as necessary, to complete the inspection. In addition , the items checked and the results, as well as, the name and signature of the person who completed the inspection must be documented, maintained and kept for at least twelve months. All documents produced must be available, during the retention period, to all persons who conduct inspections.

During the annual inspection many items need to be examined.

The equipment must be inspected for all of the following:

OSHA 1926.1412(f)

- Equipment structure including the boom and, if equipped, the jib for deformation, cracks, or corrosion.
- Bolts, rivets, and fasteners for deformation, cracking, or significant corrosion.
- Welds for cracks.
- Sheaves and drums for cracks or significant wear.
- Pins, bearings, shafts, gears, rollers and locking devices for distortion, cracking or wear.
- Brakes and clutch system parts linings, pawls, and ratchets for excessive wear.
- Safety devices and operational aids for proper operation and inaccuracies.
- Gasoline, diesel, electric, or other power plants for safety related problems and conditions, and proper operation.
- Chains and chain drives for wear and stretch.
- Travel and steering, brakes, and locking devices.
- Tires.
- Hydraulic, pneumatic and other pressurized hoses, fittings, and tubing as follows:
- Flexible hose and its junction with fittings for leaks.
- Threaded or clamped joints for leaks.
- Outer surface of hose, rigid tube, or fitting for excessive abrasion , scrubbing deformation or wear that could result in failure.
- Hydraulic and pneumatic pumps and motors as follows:
- Performance indicators: unusual noises or vibration, low operating speed, excessive heating of the fluid, and low pressure. Loose bolts or fasteners.
- Shaft seals and joints between pump sections for leaks.
- Hydraulic and pneumatic valves, as follows:
- Spools: Sticking, improper return to neutral
- Leaks.
- Valve housing for cracks.
- Relief valves: failure to reach pressure during pressure test.
- Hydraulic and pneumatic cylinders, as follows:
- Drifting caused by external or internal leaks
- Cylinder rods for scores, nicks, or dents.
- Case (barrel) for significant dents.
- Rod eyes and connecting joints for deformation or looseness.
- Outrigger or stabilizer pads/floats.
- Slider pads.
- Electrical components and wiring.
- Warning labels and decals manufacturer equipped or required under this standard.
- Operators seat missing or unserviceable.
- Steps, ladders handrails or guards missing or unusable.

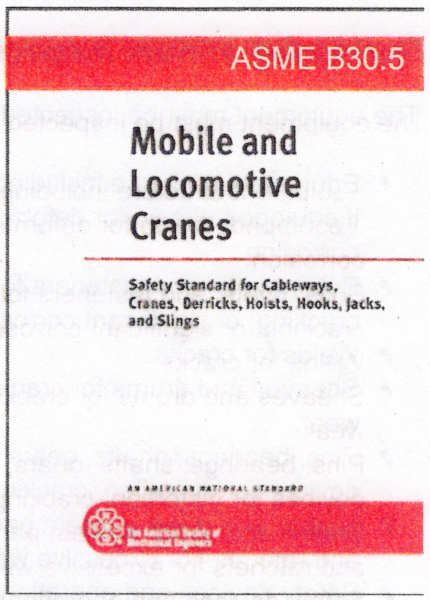
ASME B30.5, Mobile and Locomotive Cranes, has several categories of inspections.

Initial inspection:
Prior to initial use, all new and altered cranes shall be inspected by a qualified person.

Regular Inspections:
Frequent - daily to monthly by a designated person.
Periodic – 1 -12 month intervals, or as recommended by the manufacturer or a qualified person.

ASME frequent inspections include:

- All control mechanisms for maladjustment interfering with proper operation: daily, when used.
- All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
- Operational aids for malfunction: daily, when used.
- All hydraulic hoses, particularly those that flex in normal operation of crane functions, should be visually inspected once every working day, when used.
- Hooks and latches for deformation, chemical damage, cracks and wear.
- Rope reeving for compliance with crane manufacturer.
- Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
- Hydraulic system for proper oil level: daily, when used.
- Tires for recommended inflation pressure.
- Structural for damage or deformation.



ASME periodic inspections include:

- Deformed, cracked, or corroded members in the crane structure and entire boom.
- Loose bolts or rivets.
- Cracked or worn sheaves and drums.
- Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking devices.
- Excessive wear on brake and clutch system parts, linings, pawls, and ratchets.
- Any significant inaccuracies of operational aids.
- Lack of compliance with safety requirements of gasoline, diesel, electric power plants.
- Excessive wear of chain drive sprockets and excessive chain stretch.
- Hydraulic and pneumatic pumps and motors.
- Hydraulic and pneumatic valves.
- Evidence of rubber particles on the hydraulic filter element, which may indicate hose, "0" ring, or other rubber component deterioration.
- Cracks in crane hooks.